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| 09/608,874 | 06/30/2000 | Jyoti Mazumder | POM-12302/29 | 2635 |

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| EXAMINER | |
|---|---|
| GARLAND, STEVEN R | |
| ART UNIT | PAPER NUMBER |
| 2125 | |

| SHORTENED STATUTORY PERIOD OF RESPONSE | MAIL DATE | DELIVERY MODE |
|---|---|---|
| 3 MONTHS | 12/20/2006 | PAPER |

**Please find below and/or attached an Office communication concerning this application or proceeding.**

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

| Office Action Summary | Application No. | Applicant(s) | |
|---|---|---|---|
| | 09/608,874 | MAZUMDER, JYOTI | |
| | Examiner | Art Unit | |
| | Steven R. Garland | 2125 | |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on *10 October 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *1-3 and 5-10* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-3,5-10* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

## DETAILED ACTION

1. Claims 1-3 and 5-10 are pending.

2. Claims 1-3, 5,9 and 10 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In claim 1, line 9, "the location" and " the laser" both lack a proper antecedent basis. It also appears that phrase " the location or intensity of the laser" refers to a laser beam not a laser and is misdescriptive.

In claim 5, line 1 it is unclear which laser is being referred to.

Claims 9 and 10 have similar problems.

The other claims fall with parent claims.

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 1 and 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Islam et al. 6,269,540.

Islam et al. teaches depositing a metal powder on a substrate and melting the powder using a laser ( direct metal deposition). Islam also teaches controlling the cooling of the deposited metal by use of a laser. See the abstract; figures; col. 2, lines

6-32; col. 3, lines 27-60;col. 4, lines 35-43; col. 5, lines 1-57; col. 6, lines 1-35 and the claims.

Islam also teaches that if hard materials sensitive to thermal shock or types of materials that undergo cooling rate dependent transformations are used that a laser can be used to control the cooling rate of the deposited metal. ( col. 6, lines 23-34). . Islam also teaches that this beam follows the deposition beam which location changes during deposition ( col. 6, lines 23-34).

Islam however does not specifically state that the cooling laser beam is incapable of remelting the material.

It would have been obvious to one of ordinary skill in the art to modify Islam in view of the teaching of Islam and provide a cooling laser beam which does not melt the material but instead controls the cooling rate to prevent shock and control the stress in the deposited material.

Also note the priority claim of Islam to the provisional application 60/103052.

In response to applicant's arguments, note col. 6, lines 23-34 of Islam expressly dealing with control of the cooling rate for materials that undergo cooling rate dependent transformations or to prevent thermal shock. Further a laser beam used for cooling a melted material should produce a temperature below the materials melting point otherwise it would result in melting not cooling a melted material.

5. Claims 2,3, 5 and 7-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Islam et al. 6,269,540 in view of Murnick 5,427,825.

Islam et al. teaches depositing a metal powder on a substrate and melting the powder using a laser ( direct metal deposition). Islam also teaches controlling the cooling of the deposited metal by use of a laser. See the abstract; figures; col. 2, lines 6-32; col. 3, lines 27-60;col. 4, lines 35-43; col. 5, lines 1-57; col. 6, lines 1-35 and the claims.

Islam also teaches the use in the prior art of a laser with coaxial metal powder feed ( col. 2, lines 6-32). Islam also teaches that if hard materials sensitive to thermal shock or types of materials that undergo cooling rate dependent transformations are used that a laser can be used to control the cooling rate of the deposited metal. Islam teaches that this beam follows the deposition beam which location changes during deposition ( col. 6, lines 23-34).

Islam however does not specifically provide the cooling laser beam with the coaxial powder feed embodiment or specifically state that the cooling laser beam does not melt the deposited material.

It would have been obvious to one of ordinary skill in the art to modify Islam in view of the teaching of Islam and provide a cooling laser beam to cool the melted deposited metal from the coaxial powder feed head to reduce thermal shock to a hard material being deposited or to a material which undergoes a cooling rate transformation.

It would have been obvious to one of ordinary skill in the art to modify Islam in view of the teaching of Islam and provide a cooling laser beam which does not melt the material but instead controls the cooling rate to prevent shock and control the stress in the deposited material.

Islam also teaches generating multiple laser beams ( col. 6,, lines 1-6) by use of a single laser or beam splitting techniques. The priority document of Islam 60/103052 only shows the use of multiple beams and does not specify how they are generated.

Islam however fails to specifically teach generating multiple beams from a single laser in which at least one is used for melting and another is used for cooling, control of the intensity by defocusing a beam to control cooling, use of multiple beams to control cooling.

Murnick teaches fusing a powdered material using a laser and then controlling the cooling of the fused material using a laser during the annealing step to reduce stress. Murnick teaches a variety of methods such as using the same beam to control both stress and melting; using a plurality of lasers for cooling; adjusting the focus or intensity of the laser to control cooling. See the abstract; figures; col. 2, lines 40-55; col. 3, line 13 to col. 4, line 37; col. 4, line 67 to col. 5, line 11; col. 5, lines 55-63; col. 9, lines 28-66; col. 11, line 58 to col. 12, line 35; and the claims.

It would have been obvious to one of ordinary skill in the art to modify Islam in view of Murnick to use multiple beams or defocus the beam to reduce stress.

Further it would have been obvious to one of ordinary skill in the art to modify Islam in view of Murnick to use the same laser to both deposit the material and to reduce the stress to reduce the required number of lasers.

In response to applicant's arguments, note col. 6, lines 23-34 of Islam expressly dealing with control of the cooling rate for materials that undergo cooling rate dependent transformations or to prevent thermal shock. Further a laser beam used for

cooling a melted material would produce a temperature below the materials melting point otherwise it would result in melting not cooling a melted material.

Also in response to applicant's arguments Islam in col. 6, lines 1-6 teaches generating multiple beams from a single laser and then Murnick in figure 5 and col. 11, line 67 to col. 12, line 10 teaches the use of multiple beams for melting and annealing. One of ordinary skill in the art would recognize that since one laser can be used to produce multiple beams (Islam) and that each beam can also perform a different function (Murnick) that the two teachings can be combined so that one laser produces multiple beams for different functions resulting in the need for less lasers. Applicant should also review the various sections cited above.

6. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Beaman et al. 5,352,405 in view of Sterett 5,746,844.

Beaman et al. teaches depositing a powder, sintering the powder using a laser and then using the laser to insure that the adjacent parts are sintered together ( col. 7, lines 46-51 ) for structural integrity by overlapping the scans. See the abstract; figures; col. 1, lines 44-50; col. 7, line 39 to col. 8, line 5. Beaman also teaches that if necessary annealing can be performed depending on the material powder being used and the final use of the product. Col 6, lines 44-51.

Beaman however does not specifically disclose that a metal powder is being used, but does teach the use of metal powders.

It would have been obvious to one of ordinary skill in the art to modify Beaman in view of Beaman's teaching and use a metal powder so that an accurately built metal object could be formed.

Beaman also fails to teach the use of a laser to perform the annealing process.

Sterett et al. teaches the use of a laser to anneal a metal to reduce stress. The annealing inherently takes place at a temperature, below the melting point, at which the grains of metal recrystallize. See the title, abstract; figures; col. 5, lines 34-67; col. 11, lines 46-52; col. 16, lines 23-40; and claim 1. Note the previously cited heat treatment (metallurgy) article by Averbach.

It would have been obvious to one of ordinary skill in the art to modify Beaman in view of Sterett and use a laser for annealing so that the object could be immediately used.

In response to applicant's arguments, the examiner stated that Beaman suggested the use of metal powders but did not expressly show their use ,see col. 1, lines 44-50 of Beaman. Sterett in col. 16, lines 23-40, provides motivation to perform laser annealing immediately after deposition so that warping, curling, and stresses are reduced and precise temperature control is achieved.

7. Claims 7-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Beaman et al.5,352,405 in view of Sterett 5,746,844 as applied to claim 6 above, and further in view of Murnick 5,427,825.

Beaman et al. teaches depositing a powder, sintering the powder using a laser and then using the laser to insure that the adjacent parts are sintered together ( col. 7,

lines 46-51 ) for structural integrity by overlapping the scans. See the abstract; figures; col. 1, lines 44-50; col. 7, line 39 to col. 8, line 5. Beaman also teaches that if necessary annealing can be performed depending on the material powder being used and the final use of the product. Col 6, lines 44-51.

Beaman however does not specifically disclose that a metal powder is being used, but does teach the use of metal powders.

It would have been obvious to one of ordinary skill in the art to modify Beaman in view of Beaman's teaching and use a metal powder so that an accurately built metal object could be formed.

Beaman also fails to teach the use of a laser to perform the annealing process.

Sterett et al. teaches the use of a laser to anneal a metal to reduce stress. The annealing inherently takes place at a temperature, below the melting point, at which the grains of metal recrystallize. See the title, abstract; figures; col. 5, lines 34-67; col. 11, lines 46-52; col. 16, lines 23-40; and claim 1. Note the previously cited heat treatment (metallurgy) article by Averbach.

It would have been obvious to one of ordinary skill in the art to modify Beaman in view of Sterett and use a laser for annealing so that the object could be immediately used and not require further post processing.

Beaman and Sterett however do not teach use the same laser to perform both deposition and annealing. Beaman and Sterett also do not teach the use of a plurality of lasers or defocus the beam to control stress.

Murnick teaches fusing a powdered material using a laser and then controlling the cooling of the fused material using a laser during the annealing step to reduce stress. Murnick teaches a variety of methods such as using the same beam to control both stress and melting; using a plurality of lasers for cooling; adjusting the focus or intensity of the laser to control cooling. See the abstract; figures; col. 2, lines 40-55; col. 3, line 13 to col. 4, line 37; col. 4, line 67 to col. 5, line 11; col. 5, lines 55-63; col. 9, lines 28-66; col. 11, line 58 to col. 12, line 35; and the claims.

It would have been obvious to one of ordinary skill in the art to modify Beaman and Sterett in view of Murnick to use multiple beams or defocus the beam to reduce stress.

Further it would have been obvious to one of ordinary skill in the art to modify Beaman and Sterett in view of Murnick to use the same laser to both deposit the material and to reduce the stress to reduce the required number of lasers.

In response to applicant's arguments, Murnick is clearly relevant for teaching various annealing techniques that allow for improved cooling and that do not require a separate post processing annealing step. Murnick in the above noted sections teaches a variety of methods such as defocusing, use of multiple beams etc. to reduce stress and cracking.

8. In the following rejection the metal recited in the preamble has not been given patentable weight because the recitation occurs in the preamble. A preamble is generally not accorded any patentable weight where it merely recites the purpose of a process or the intended use of a structure, and where the body of the claim does not

depend on the preamble for completeness but, instead, the process steps or structural limitations are able to stand alone. See *In re Hirao*, 535 F.2d 67, 190 USPQ 15 (CCPA 1976) and *Kropa v. Robie*, 187 F.2d 150, 152, 88 USPQ 478, 481 (CCPA 1951).

9. Claims 6-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Murnick 5,427,825.

Murnick teaches fusing a powdered material using a laser and then controlling the cooling of the fused material using a laser during the annealing step to reduce stress. Murnick teaches a variety of methods such as using the same beam to control both stress and melting; using a plurality of lasers for cooling; adjusting the focus or intensity of the laser to control cooling. See the abstract; figures; col. 2, lines 40-55; col. 3, line 13 to col. 4, line 37; col. 4, line 67 to col. 5, line 11; col. 5, lines 55-63; col. 9, lines 28-66; col. 11, line 58 to col. 12, line 35; and the claims.

Murnick while teaching the use of powered material during material deposition does not specifically show its use. Col. 4, line 67 to col. 5, line 5.

It would have been obvious to one of ordinary skill in the art to modify Murnick to use powered material to repair an object and give the proper appearance in view of the teaching of Murnick.

In response to applicant's arguments, Murnick teaches that surface should be continuous and not have defects ( proper appearance ) col. 4, lines 60-68 of Murnick for example.

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Steven R. Garland whose telephone number is 571-272-3741. The examiner can normally be reached on Monday-Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Leo Picard can be reached on 571-272-3749. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Steven R Garland
Examiner
Art Unit 2125

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LEO PICARD
SUPERVISORY PATENT EXAMINER
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